

**PARASITISM OF *EYSARCORIS TRIMACULATUS* (DISTANT)  
(HEMIPTERA: PENTATOMIDAE) BY TWO TACHINID FLIES  
(DIPTERA: TACHINIDAE)**

I.R. KAY

*Agency for Food and Fibre Sciences, Queensland Horticulture Institute, QDPI, Bundaberg  
Research Station, 49 Ashfield Road, Bundaberg, Qld 4670*

**Abstract**

*Cylindromyia expansa* Cantrell and *Alophora (Mormonomyia)* sp. are recorded parasitising *Eysarcoris trimaculatus* (Distant) adults in the Burdekin River Irrigation Area of northern Queensland. Parasitism rates ranged from 0-16% and parasitism was recorded in most months of the year.

**Introduction**

There are few records of parasitism of adult or nymphal Australian pentatomid bugs by flies in the family Tachinidae. Cantrell (1984, 1986) reported records of *Cylindromyia rufifemur* Paramov from two species of Pentatomidae, while Coombs and Khan (1997) provided host/parasitoid records for five species of Pentatomidae and seven species of Tachinidae. These authors commented on the paucity of such records.

*Eysarcoris trimaculatus* (Distant) is a small, brownish bug found in Western Australia, Northern Territory, Queensland and New South Wales (Wood and McDonald 1984). It is a pest of rice (Learmonth 1980, Halfpapp *et al.* 1992). Kay (1993) studied its developmental biology and occurrence in rice fields in northern Queensland. Records of parasitism of adult *E. trimaculatus* by tachinid flies noted during that study are reported here.

**Materials and methods**

Adult *E. trimaculatus* were collected from rice (*Oryza sativa* L.) or from stands of mixed weeds, including barnyard grass (*Echinochloa colona* (L.) Link), sedges (*Cyperus* spp.) and rice grass (*Leersia hexandra* Sw.), on which they also feed (Kay 1993). Collections were made with a sweep net on three occasions during 1987 near Clare (19°47'S, 147°13'E) in the Burdekin River Irrigation Area. The bugs were held in the laboratory and provided with rice panicles for food. They were checked every two days until parasitoids emerged or they died, with all dead bugs dissected. Several parasitoid pupae were collected on the day they appeared in the holding containers and were held at 24.5°C with a 14:12 L:D photoperiod until adults emerged. The parasitoids were identified. A total of 86 fifth (final) instar *E. trimaculatus* nymphs in lots of from three to 25 were collected from the field near Clare at various times from March 1987 to May 1988 and held in the laboratory until they developed to adults, which took from 1-7 days (mean 3.85 days).

From February 1987 to January 1988 twelve monthly collections of *E. trimaculatus* adults were made at Clare from rice and weeds. Females were

dissected to determine their reproductive status (Kay 1993). The number of females found to contain parasitoid larvae was recorded.

## Results

Two species of Tachinidae, both in the subfamily Phasiinae, were reared from *E. trimaculatus* adults. They were *Cylindromyia expansa* Cantrell and *Alophora (Mormonomyia)* sp. Seven *C. expansa* and one *Alophora* sp. were reared from 49 adult *E. trimaculatus* collected in early March, four *C. expansa* emerged from 149 adult *E. trimaculatus* in mid May and one *Alophora* sp. emerged from 84 adult *E. trimaculatus* in mid June. Specimens are held in the QDPI Insect Collection, Brisbane, under the following Accession Numbers: *C. expansa* K2927 and K2928; *Alophora* sp. K2922 and K2929. (Also, specimens of adult *Alophora* sp. collected with a sweep net in rice stubble at Clare in June 1987 are held under the numbers K2923 and K2924.) No parasitoids emerged from the field-collected nymphs.

Both *C. expansa* and *Alophora* sp. emerged from the host as larvae and pupated externally as their pupae were found in the holding container. Parasitised bugs dissected after death were found to be hollow shells with the thorax and abdomen completely empty. The numbers of parasitised *E. trimaculatus* corresponded to the number of parasitoid pupae recovered indicating that only one parasitoid developed in each host. *C. expansa* adults emerged in 10-11 days from pupae held at 24.5°C.

Parasitoid larvae were found in some female *E. trimaculatus* that were dissected to determine their reproductive status. The identity of the parasitoids is not known, but probably they were one or both of the tachinids recorded. The percentage parasitism rates for each collection date (1987 unless stated otherwise) and the number of female *E. trimaculatus* dissected (n) were: 17 February 1.7% (58); 10 March 4.0% (25); 23 April 4.0% (99); 21 May 6.9% (29); 23 June 0% (79); 23 July 0% (7); 18 August 0% (13); 22 September 10.7% (28); 21 October 3.7% (54); 25 November 5.3% (38); 23 December 2.0% (49); 25 January 1988 0% (66).

## Discussion

Two more host/parasitoid records for Australian pentatomids/tachinids are added to those few previously known (Cantrell 1984, 1986, Coombs and Khan 1997). This is the first host record for *C. expansa*. While there are several Australian records of hemipterous insects as hosts of species of *Alophora* (Cantrell 1986, Coombs and Khan 1997), Cantrell (1984) pointed out that the Australian species of *Alophora* were in need of a thorough review. The exact identity of the *Alophora* species and their host/parasitoid relationships will remain undetermined until the review is done.

While these are the first parasitoids recorded from an Australian species of *Eysarcoris* Hahn there are records of parasitism of members of the genus by tachinids from other regions of the world. Cheema *et al.* (1973) reared two

tachinids (*Plesiocyptera evibrissata* Townsend and *Preeuthera tuckeri* Bezzi) from adult *Eysarcoris inconspicuus* Herrich-Schäffer and found unidentified tachinid larvae in *E. inconspicuus*, *Eysarcoris guttiger* Thunberg and *Eysarcoris modestus* Distant in Pakistan. In Japan, the tachinid *Gymnosoma rotundatum* L. was recorded from nymphs and adults of *Eysarcoris ventralis* (Westwood) and *Eysarcoris lewisi* (Scott), while an unidentified fly parasitised *Eysarcoris parvus* Uhler (Ito 1978, Nakazawa and Hayashi 1984). Richter and Markova (1999) reared *Cylindromyia umbripennis* van der Wulp from *Eysarcoris aeneus* (Scopoli) in Russia.

This study provided limited biological and ecological information on the parasitoids. One parasitoid developed in each host. As *E. trimaculatus* are small bugs (adults are approximately 5 mm long by 3 mm wide), it is likely that they are able to support the development of only one parasitoid to maturity. Parasitism rates of adult *E. trimaculatus*, as determined by rearing and dissection, were low, ranging from 0-16%, similar to rates reported by Cheema *et al.* (1973) for *Eysarcoris* spp. in Pakistan (0.4-12.5%) but lower than that due to *G. rotundatum* in Japan, which averaged 20% (Nakazawa and Hayashi 1984). No parasitoids were reared from *E. trimaculatus* nymphs but this may simply reflect the low numbers collected on any one day. Cheema *et al.* (1973) commented that parasitism of *Eysarcoris* spp. nymphs in Pakistan was extremely rare, while Nakazawa and Hayashi (1984) reported that *G. rotundatum* commonly parasitised both nymphs and adults in Japan but that it preferred to oviposit in adults rather than nymphs. More extensive collecting and rearing of *E. trimaculatus* nymphs is needed to determine if the tachinids will parasitise them. The duration of the pupal stage of *C. expansa* is 10-11 days at 24.5°C. The rearing and dissection data indicate that the parasitoids were active for most of the year, although no parasitised *E. trimaculatus* were recorded in July and August, during the district's mild, dry winter. It is not known whether the lack of recorded parasitism in July and August reflects a lack of activity by the parasitoids during winter or that parasitism rates were too low to be recorded. *E. trimaculatus* adults and nymphs were scarce and occurred on scattered, isolated patches of weeds in moist areas during those months (Kay 1993).

### Acknowledgements

I thank Bryan Cantrell for identifying the flies and for his helpful comments on the draft manuscript. John Brown provided technical assistance. The Queensland Rice Marketing Board partly funded the studies on *E. trimaculatus* and many rice growers in the Burdekin district kindly allowed me to collect from their crops.

### References

- CANTRELL, B.K. 1984. Synopsis of the Australian Phasiinae, including revisions of *Gerocyptera* Townsend and the Australian species of *Cylindromyia* Meigen (Diptera: Tachinidae). *Australian Journal of Zoology Supplementary Series* **102**: 1-60.

- CANTRELL, B.K. 1986. An updated host catalogue for the Australian Tachinidae (Diptera). *Journal of the Australian Entomological Society* 25: 255-265.
- CHEEMA, M.A., INSHAD, M., MURTAZA, M. and GHANI, M.A. 1973. Pentatomids associated with Gramineae and their natural enemies in Pakistan. *Commonwealth Institute of Biological Control Technical Bulletin* 16: 47-67.
- COOMBS, M. and KHAN, S.A. 1997. New host/parasitoid records for Australian Pentatomidae, Tachinidae and Braconidae. *Australian Entomologist* 24: 61-64.
- HALFPAPP, K.H., KAY, I.R. and BROWN, J.D. 1992. Rice. Pp. 89-93, in: ELDER, R.J., BROUGH, E.J. and BEAVIS, C.H.S. (Eds.) *Insect and mite management guide - field crops, forage crops and pastures*. QDPI, Brisbane. Information Series Q192004.
- ITO, K. 1978. Ecology of stink bugs causing pecky rice. *Review of Plant Protection Research* 11: 62-78.
- KAY, I.R. 1993. *The developmental biology of Eysarcoris trimaculatus (Distant) (Hemiptera: Pentatomidae)*. M.Sc. Thesis, James Cook University of North Queensland.
- LEARMONTH, S.E. 1980. Rice insect pests and their management in the Ord River irrigation area of Western Australia. *International Rice Research Newsletter* 5: 14.
- NAKAZAWA, K. and HAYASHI, H. 1984. Bionomics of the stink bugs and allied bugs causing the pecky rice (Hemiptera: Heteroptera). 2. Parasites of *Eysarcoris ventralis* Westwood and *Cletus punctiger* (Dallas). *Bulletin of the Hiroshima Prefectural Agricultural Experiment Station* 48: 35-48. (In Japanese with English summary.)
- RICHTER, V.A. and MARKOVA, T.O. 1999. The tachinid species *Cylindromyia umbripennis* van der Wulp new to the fauna of Russia (Diptera: Tachinidae). *Zoosystematica Rossica* 8: 188.
- WOOD, I. and MCDONALD, F.J.D. 1984. Revision of the Australian *Eysarcoris* group (Hemiptera: Pentatomidae). *Journal of the Australian Entomological Society* 23: 253-264.